CLAIMS

We claim:

1. An isolated DNA containing a promoter of the β2-subunit of neuronal nicotinic acetylcholine receptor consisting essentially of the sequence set forth in Figure 1 and sequences hybridizing to said DNA under stringent conditions.

2. An isolated DNA comprising the DNA as claimed in claim 1 operatively linked to a nucleotide sequence encoding a protein, polypeptide or peptide.

3. An isolated DNA as claimed in claim 2, wherein the protein, polypeptide or peptide is a reporter gene.

4. An isolated DNA as claimed in claim 3, wherein the reporter gene is LacZ or Luciferase.

5. An isolated nucleic acid complementary to a nucleotide sequence of claim 1 or claim 2 and sequences hybridizing to said nucleic acids under stringent conditions.

6. An isolated DNA operating as a promoter, which consists essentially of a sequence from about -245 to about -95 in Figure 1.

7. An isolated DNA as claimed in claim 6, wherein the sequence is the sequence from about -245 to about -824 in Figure 1.

8. An isolated DNA as claimed in claim 6, wherein the sequence is the sequence from about -135 to about -103 in Figure 1.

9. An isolated DNA as claimed in claim 6 wherein the sequence is the sequence from about +16 to about +36 in Figure 1.

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10. An isolated DNA as claimed in claim 6 wherein the sequence is the sequence from about -1125 to about -825 in Figure 1.

11. A recombinant vector containing the nucleotide sequence as claimed in claim 1.

12. A recombinant vector containing the nucleotide sequence of claim 2.

13. A transformed organism containing the vector as claimed in claim 9 or 10.

14. An isolated DNA having a sequence comprising the DNA of claim 1 operatively linked to a tumorigenic, oncogenic or immortalizing gene.

15. A transgenic, non-human mammal all of whose germ cells and somatic cells contain DNA as claimed in claim 2, wherein the DNA was introduced into the mammal or an ancestor of the mammal at an embryonic stage.

16. A process for the *in vitro* culture of mammalian cells, wherein the cells are isolated from a mammal as claimed in claim 15.

17. The mammal as claimed claim 15 that is a mouse.

18. A process according to claim 16 where the mammal is a mouse.

19. Cloned genomic DNA sequences encoding at least one exon of the β2-subunit of neuronal nicotinic acetylcholine receptor.

20. A method for isolating the genomic DNA clone for the β2-subunit of the mouse neuronal nicotinic acetylcholine receptor comprising providing a mouse genomic DNA library and hybridizing

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under suitable conditions a DNA probe encoding the β2-subunit of neuronal nicotinic acetylcholine receptor from another mammalian species.

21. Plasmid pSA9.

22. Plasmid pEA5.

23. Phage λβ2 nAchR.

24. A nucleic acid probe consisting essentially of the sequence as claimed in claim 1 or claim 19.

25. A macromolecular complex comprising a DNA as claimed in claim 1 or claim 19 and a protein.

26. A method for the assay or identification of transcriptionally active proteins, wherein DNA as claimed in claim 1 or claim 19 is incubated under suitable conditions with nuclear extracts.

27. A method as claimed in claim 26 wherein the DNA is the sequence of oligonucleotide E-D, Mut-E, or S-E.

28. A method for isolating neurons from non-human tissue comprising providing a transgenic mammal as claimed in claim 15, wherein the encoded protein is a reporter gene, identifying the neurons which express the reporter gene, and separating the neurons that express the reporter gene from other cells.

29. A method for targeting the expression of a desired polypeptide, protein or peptide product to neurons in a non-human, transgenic mammal comprising replacing the gene for the β2-subunit of neuronal nicotinic acetylcholine receptor with the DNA encoding the desired product in the genome of the mammal by

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homologous recombination, where said product is encoded by a DNA sequence.

30. A mammal as claimed in claim 15, wherein the DNA has been mutated by point mutation, deletion, insertion or other means whereby the activity of the neuronal nicotinic acetylcholine receptor has been altered as measured by biochemical assay or behavioral assay of a transgenic mammal.

31. A cell line produced from the mammal as claimed in claim 30.

32. Recombinant DNA as claimed in claim 1 or claim 19, wherein the DNA has been mutated by point mutation, deletion, insertion or other means whereby a $\beta 2$-subunit of neuronal nicotinic acetylcholine receptor expressed from said DNA has an altered activity as measured by biochemical assay or behavioral assay in a transgenic mammal.

33. An isolated DNA fragment obtainable by cutting the DNA of claim 23 with restriction enzyme or mechanical shearing.

34. A DNA consisting essentially of a the DNA in claim 1, or a fragment of the DNA in claim 1, operatively linked to a nonhomologous DNA sequence encoding a protein, polypeptide, or peptide.

35. A DNA as claimed in claim 34, which comprises sequences sufficient to promote transcription of an operatively linked DNA sequence in neuronal cells.

36. A cell line comprising in its genome a foreign nucleotide sequence corresponding to the DNA as claimed in one of claim 1 to claim 10.

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37. A method of screening compounds for the ability to restore or detectably effect activity of the neuronal nicotinic acetylcholine receptor comprising adding the compound to a cell line as claimed in claim 31 or claim 36 or introducing the compound into a mammal as claimed in claim 30.

38. Recombinant mutated DNA consisting essentially of the DNA of claim 1 or claim 19, or DNA derived therefrom, wherein the β2-subunit gene or fragment thereof prevents the expression of an efficient nicotinic acetylcholine receptor in a suitable expression system and host.

39. A transgenic mammal as claimed in claim 15, generated by providing a first mammal carrying wild type or mutated DNA, crossing said first animal with a second mammal carrying different, not identical DNA.

add B1

add C6

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